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# The relationship between inservice teachers' beliefs about computers and their levels of computer use.

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**THE RELATIONSHIP BETWEEN INSERVICE TEACHERS' BELIEFS  
ABOUT COMPUTERS AND THEIR LEVELS OF COMPUTER USE**

by

**Samantha Hendricks**

**A Thesis**

**Submitted to the Faculty of Graduate Studies and Research  
through the Faculty of Education  
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**Windsor, Ontario, Canada**

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## **Abstract**

**This study investigated the relationship between inservice teachers' beliefs about computers and their levels of computer use. Teacher beliefs were constructed from five measures: self-confidence, self-competence, perceived value of computers, computer experience, and perceived likelihood of using computers under differential access to computers, programs, and a computer-knowledgeable individual. Levels of computer use were subdivided into three areas for which computers would be used: personal, teaching, and student learning.**

**The sample consisted of 80 inservice teachers enrolled in inservice courses offered at the University of Windsor. Data was gathered at the end of September and at the beginning of October in 1997. A questionnaire served as the data collection instrument.**

**Overall, three out of the five independent variables were found to be significantly related to the tested levels of computer use: self-confidence, perceived value of computers, and perceived likelihood of using computers under differential access to resources. Specifically, significant items were: (1) self-confidence in using a computer in general, for personal needs, and for work; (2) perceived value of computers for personal needs, creating instructional support materials, and classroom instruction in general; and (3) perceived likelihood of using computers under differential access to computers and programs.**

**Perceived value of computers for classroom instruction in general was the**

**only independent variable significantly related to levels of computer use for "student learning". Moreover, neither self-competence nor computer experience were significantly related to levels of computer use. Possible implications for inservice programs are suggested.**



*dedicated to my parents, Pat and Bruce, for  
a lifetime of support;  
to my best friend, Peter, for always  
being there for me; and  
to my sisters, Karen and Cindy,  
for the smiles and laughter*

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## Table of Contents

<b>Abstract .....</b>	<b>iv</b>
<b>Dedication .....</b>	<b>vi</b>
<b>Acknowledgements .....</b>	<b>vii</b>
<b>List of Tables .....</b>	<b>x</b>
<b>List of Figures .....</b>	<b>xii</b>
<b>Chapter</b>	
<b>I. Introduction .....</b>	<b>1</b>
<b>General Statement of the Problem.....</b>	<b>3</b>
<b>II. Literature Review.....</b>	<b>6</b>
<b>Conceptual Model .....</b>	<b>7</b>
<b>Self-Confidence .....</b>	<b>9</b>
<b>Self-Competence.....</b>	<b>13</b>
<b>Perceived Value of Computers.....</b>	<b>15</b>
<b>Computer Experience.....</b>	<b>21</b>
<b>Perceived Likelihood of Using Computers under</b>	
<b>Differential Access to Resources.....</b>	<b>25</b>
<b>Levels of Computer Use.....</b>	<b>26</b>
<b>III. Methodology.....</b>	<b>29</b>
<b>Sample.....</b>	<b>29</b>
<b>Research Questions.....</b>	<b>29</b>
<b>Instrumentation.....</b>	<b>30</b>
<b>Demographics.....</b>	<b>30</b>
<b>Self-confidence.....</b>	<b>30</b>
<b>Self-competence.....</b>	<b>31</b>
<b>Perceived value of computers.....</b>	<b>31</b>
<b>Computer experience.....</b>	<b>31</b>
<b>Perceived likelihood of using computers under</b>	
<b>differential access to resources.....</b>	<b>32</b>
<b>Levels of computer use.....</b>	<b>34</b>

	<b>Procedures.....</b>	<b>35</b>
	<b>Research Design and Analysis.....</b>	<b>35</b>
<b>IV.</b>	<b>Results.....</b>	<b>39</b>
	<b>Levels of Computer Use.....</b>	<b>39</b>
	<b>Self-Confidence.....</b>	<b>39</b>
	<b>Self-Competence.....</b>	<b>43</b>
	<b>Perceived Value of Computers.....</b>	<b>43</b>
	<b>Computer Experience .....</b>	<b>47</b>
	<b>Perceived Likelihood of Using Computers under</b>	
	<b>Differential Access to Resources.....</b>	<b>49</b>
<b>V.</b>	<b>Discussion .....</b>	<b>52</b>
	<b>Levels of Computer Use.....</b>	<b>52</b>
	<b>Self-Confidence.....</b>	<b>55</b>
	<b>Self-Competence.....</b>	<b>56</b>
	<b>Perceived Value of Computers.....</b>	<b>57</b>
	<b>Computer Experience.....</b>	<b>58</b>
	<b>Perceived Likelihood of Using Computers under</b>	
	<b>Differential Access to Resources.....</b>	<b>59</b>
	<b>Implications for Inservice Programs.....</b>	<b>60</b>
	<b>Limitations of the Study.....</b>	<b>62</b>
	<b>Suggestions for Further Studies.....</b>	<b>62</b>
	<b>References.....</b>	<b>64</b>
	<b>Appendix.....</b>	<b>68</b>
	<b>Vita Auctoris.....</b>	<b>75</b>

## List of Tables

Table 1

<u>Summary of MANOVAs Performed</u> .....	36
---	----

Table 2

<u>Summary of Pearson Correlations Performed</u> .....	37
--	----

Table 3

<u>Means and Standard Deviations for Levels of Computer Use</u> .....	40
---	----

Table 4

<u>Means, Standard Deviations, and MANOVA and Univariate results for Self-Confidence</u> .....	41
--	----

Table 5

<u>Means, Standard Deviations, and MANOVA and Univariate results for Self-Competence</u> .....	44
--	----

Table 6

<u>Means, Standard Deviations, and MANOVA and Univariate results for Perceived Value of Computers</u> .....	46
---	----

Table 7

<u>Means, Standard Deviations, Frequencies, and MANOVA and Univariate results for Computer Experience</u> .....	48
---	----

**Table 8**

<b><u>Means and Standard Deviations for Perceived Likelihood of Using</u></b>	
<b><u>Computers under Differential Access to Resources</u>.....</b>	<b>51</b>

## **List of Figures**

<b>Figure 1. Conceptual model of previous studies.....</b>	<b>8</b>
<b>Figure 2. Conceptual model of present study.....</b>	<b>10</b>

## **Introduction**

**Since the introduction of computers into instruction less than two decades ago, educational computing has become pervasive in many classrooms.**

**Throughout history a primary goal of education has been to create a literate society (Tetenbaum & Mulkeen, 1985/1986). With the influx of computers into schools, computer literacy has become an important skill to acquire. Although computers have brought about unprecedented changes in society, they have also been met with limited success in the schools (Eggers & Wedman, 1984; Tetenbaum & Mulkeen, 1985/1986). For example, with reduced funding and increased class enrolment, access to computer resources may be limited or even scarce within some schools or boards (Zammit, 1992). Moreover, some educators may not adequately understand computer technology and its potential benefits to education.**

**Over the course of their careers, teachers develop knowledge about themselves, specifically beliefs about their own knowledge and skills. These beliefs originate from a variety of sources such as educational courses or workshops, other teacher educators, peers, past experiences in school as former students, and present experiences as teachers (Pintrich, 1990). Teachers judge the relative merits of these sources and develop a belief system about teaching and learning.**

**Teachers' own perceptions and self-schemas are important to consider in relation to their content knowledge and actual behaviour (Pintrich, 1990). Research**



has suggested that teachers' self-knowledge or general beliefs can influence their skills in coping with the demands of teaching and their ability to learn how to use new teaching strategies (Norris & Lumsden, 1984; Wedman & Heller, 1984). At the same time, teachers' beliefs can be viewed as a direct influence upon their classroom behaviour (Kellenberger, 1994). In other words, these beliefs follow teachers into their own classrooms. This may result in teachers using and acting upon their beliefs in their teaching (Kellenberger, 1996; Pintrich, 1990).

Teachers' belief systems may enhance or impede students' overall learning. Examining the negative aspects, beliefs can have a strong impact on one's fears or expectancy for failure (Bohlin & Hunt, 1995). For example, if teachers do not expect to succeed at a particular task such as using computers in the classroom they will be unlikely to persist at that task or may attempt to avoid that task in the future (Bohlin & Hunt, 1995; Kellenberger, 1994; Pintrich, 1990). Furthermore, given that teachers' prior knowledge and experiences may be well entrenched, these beliefs may also impede student learning. As such, difficulties may result for the teacher in terms of instruction and for the students in terms of learning the material (Pintrich, 1990). Just as students' knowledge and beliefs are important for cognitively processing information, teachers' beliefs are important for teachers' learning and development (Pintrich, 1990).

Successfully changing any educational practice necessitates the development of favourable teacher beliefs. A possible source of limited enthusiasm for

computers may be that many teachers see the suggested applications of computers and associated educational demands as unrealistic with little payoff for themselves (Ragsdale, 1988). What may appear to be a desirable goal in principle, must be viewed as desirable by the teachers concerned before an educational issue such as computers in education can be implemented quickly and effectively into classroom practice (Woodrow, 1987). Successful computer use, then, may be dependent upon teachers' beliefs about educational computing and whether they feel that they can use computers effectively. With the incorporation of technology, especially computers, into classroom instruction, teachers need to have access to sufficient resources (Zammit, 1992). Upon allowing for this, informed decisions about computer use can be made and beliefs among non-users that educational applications of computers have some payoff for teachers can be developed (Ragsdale, 1988).

#### General Statement of the Problem

Many people widely recognize that computers are useful in the overall educational enterprise. Educators too have recently emphasized the need for expanding the curricula to include computer instruction. The rationale is that knowledge about computers is necessary for students to function in a technological society. Yet educators are not solely interested in computer literacy for students, but also in using computers as instructional tools to assist in their own teaching and learning processes of students. Teachers at all levels and in all subject areas

could productively employ computers, but they must first learn about computer technology. This learning process is currently occurring in staff development programs and inservice education courses that are designed to introduce classroom teachers to computers.

Inservice computer courses are usually designed to provide teachers with "hands-on" experience. They are also often based on the assumption that the teachers must feel comfortable with computers and feel confident about their ability to work with computers before they will be able to effectively use them in the class. Teachers' own beliefs may, in turn, influence their acquisition of new knowledge about learning and teaching and their willingness to use this knowledge in the classroom (Pintrich, 1990). Yet, research is needed to provide a more comprehensive view of teachers that better reflects beliefs about one's self as an important component of teaching and learning.

The purpose of this study was to investigate inservice teachers' use of computers. In particular, this study investigated the relationship between inservice teachers' beliefs about computers and their perceived levels of computer use.

Teacher beliefs were constructed from five measures: self-confidence, self-competence, perceived value of computers, computer experience, and perceived likelihood of using computers under differential access to computers, programs, and a computer-knowledgeable individual. Levels of computer use were subdivided into three areas for which computers would be used: personal, teaching, and student

learning.

**The results of this research study will benefit teacher educators who teach inservice courses by suggesting factors that may impact teachers' use of computers. Moreover, the results can be utilized in the staff development of practitioners to facilitate learning and development and aid in the redistribution of computer resources, especially when there is a change in teaching staff within a particular school.**

## **Literature Review**

According to Ragsdale (1988), "this seems to be an age in which computers are seen as the answer to everything" (p. 1). In the midst of this computer cornucopia, the danger exists that as new applications for computers are developed and eventually adopted, an assumption, usually unstated, emerges that computers are beneficial regardless of how they are being used. In particular, computers are assumed to provide benefits for students on the basis of their physical presence alone. Ragsdale (1988) further notes that "it is not unusual to hear parents, teachers, or even principals declare with some pride that their school has a substantial number of computers, [however] they do [not really] know how they are being used" (p.19). Yet, computer use in the schools has been met with diminished enthusiasm by many teachers (Eggers & Wedman, 1984; Ragsdale, 1988). Thus, overenthusiasm or extreme skepticism may threaten the effective use of computers in education.

Since the use of computers in schools is relatively new, few standards that constitute effective instructional practices are in place. This may result in teachers having to invest substantial time and energy to learn how to use the computer as well as develop classroom strategies (Zammit, 1992). Consequently, there may be little opportunity for professional growth generated through feedback from more experienced teachers. As a result, the application of computers and its associated educational demands may be perceived as both challenging and unrealistic

(Ragsdale, 1988). This is further complicated in that students are often perceived as having a greater understanding about computers and being more at ease with their use than teachers (Zammit, 1992).

Another important, although frequently ignored, dimension of educational computing is that teachers need to be recognized as adult learners. As such, they have different needs from their students (Orlich, 1983; Ragsdale, 1988; Wedman & Heller, 1984; Wedman, Heller, & Strathe, 1986). As adult learners, teachers bring a great deal of experience to inservice courses. Thus, inservice instructors may need to consider both cognitive and general beliefs of teachers when designing inservice programs, particularly if teachers are to prepare students for this computerized society (Orlich, 1983; Pintrich, 1990; Wedman & Heller, 1984; Wedman, Heller, & Strathe, 1986; Woodrow, 1987).

Although many studies have examined levels of computer use in various school settings and beliefs of educators toward educational computing (e.g., Marcinkiewicz, 1993/1994, 1994/1995, 1996; Rosen & Weil, 1995; Stevens, 1980, 1982; Woodrow, 1987; Zammit, 1992), they have often lacked two components: (1) emergent models that would permit greater generalization of the results, and (2) broader frameworks of beliefs as they relate to levels of computer use. This study will attempt to address these issues.

### **Conceptual Model**

Figure 1 represents a general conceptual model of many previous research

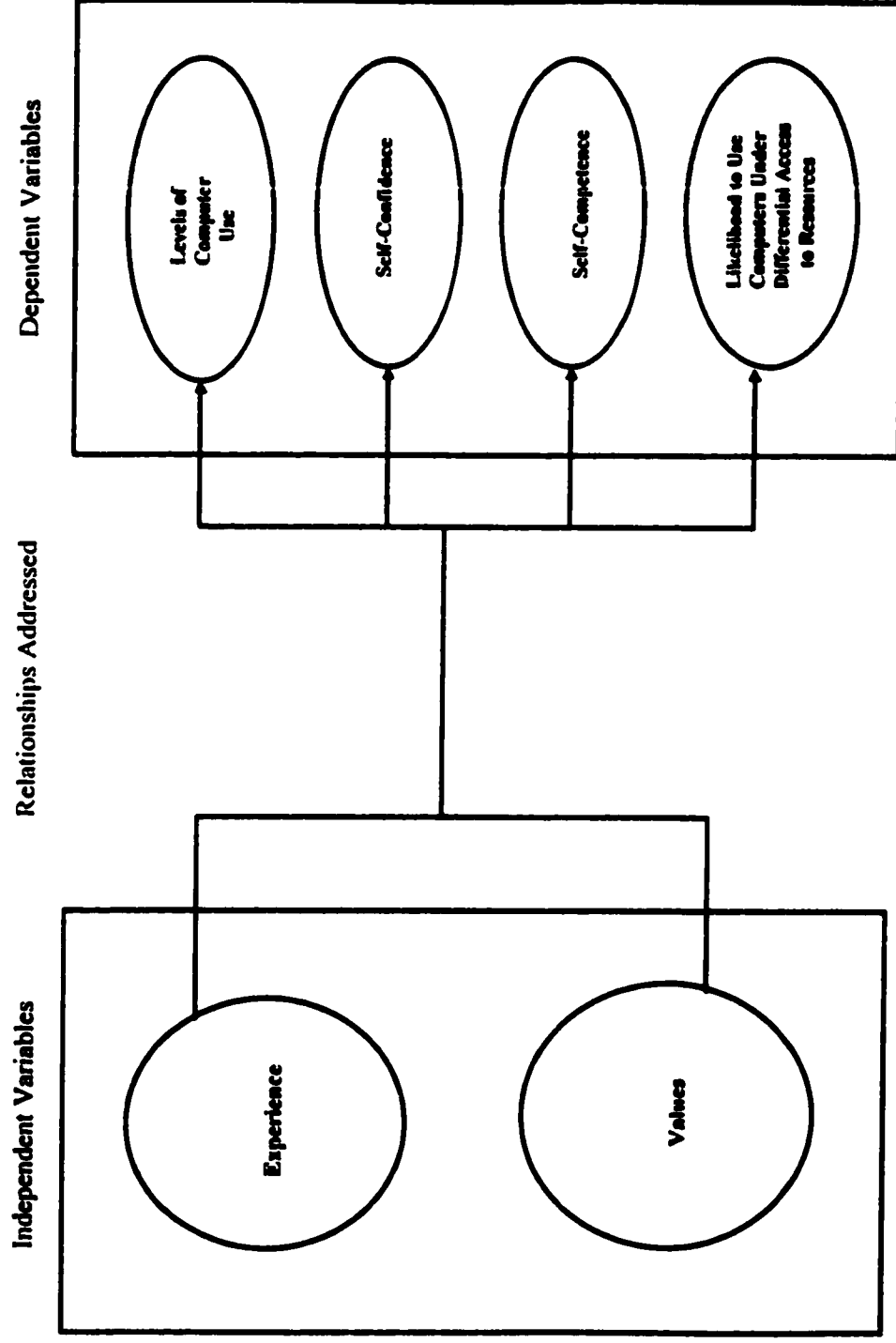


Figure 1. Conceptual model of previous studies.

studies (e.g., Kellenberger, 1994, 1996, 1997; Woodrow, 1987). The independent variables, often collectively termed "beliefs", have included such concepts as "experience" and "values". These are indicated by two circles within the independent variables box. Dependent variables, on the other hand, have included such aspects as "levels of computer use", "self-confidence", "self-competence", or "likelihood to use computers under differential access to resources". These are indicated by four ellipses within the dependent variables box. The possible relationships between the independent variables and each of the dependent variables is indicated by a solid line.

Unlike most other research, the conceptual model of the current study focuses entirely on levels of computer use as the only dependent variable. As such, one cannot exclude the possibility that, in addition to "experience" and "values", other aspects such as "self-confidence", "self-competence", and "likelihood to use computers under differential access to resources" may be related to present levels of computer use. This is represented in Figure 2.

### **Self-Confidence**

With the rise in the use of computer technology, some individuals have indicated that they felt reasonably comfortable around computers (Woodrow, 1987). However, for others, the thought of dealing with a computer has been discomfoting or even frightening (Rosen & Weil, 1990, 1995; Stevens, 1982).

In a study conducted by Woodrow (1987), teachers who were considered



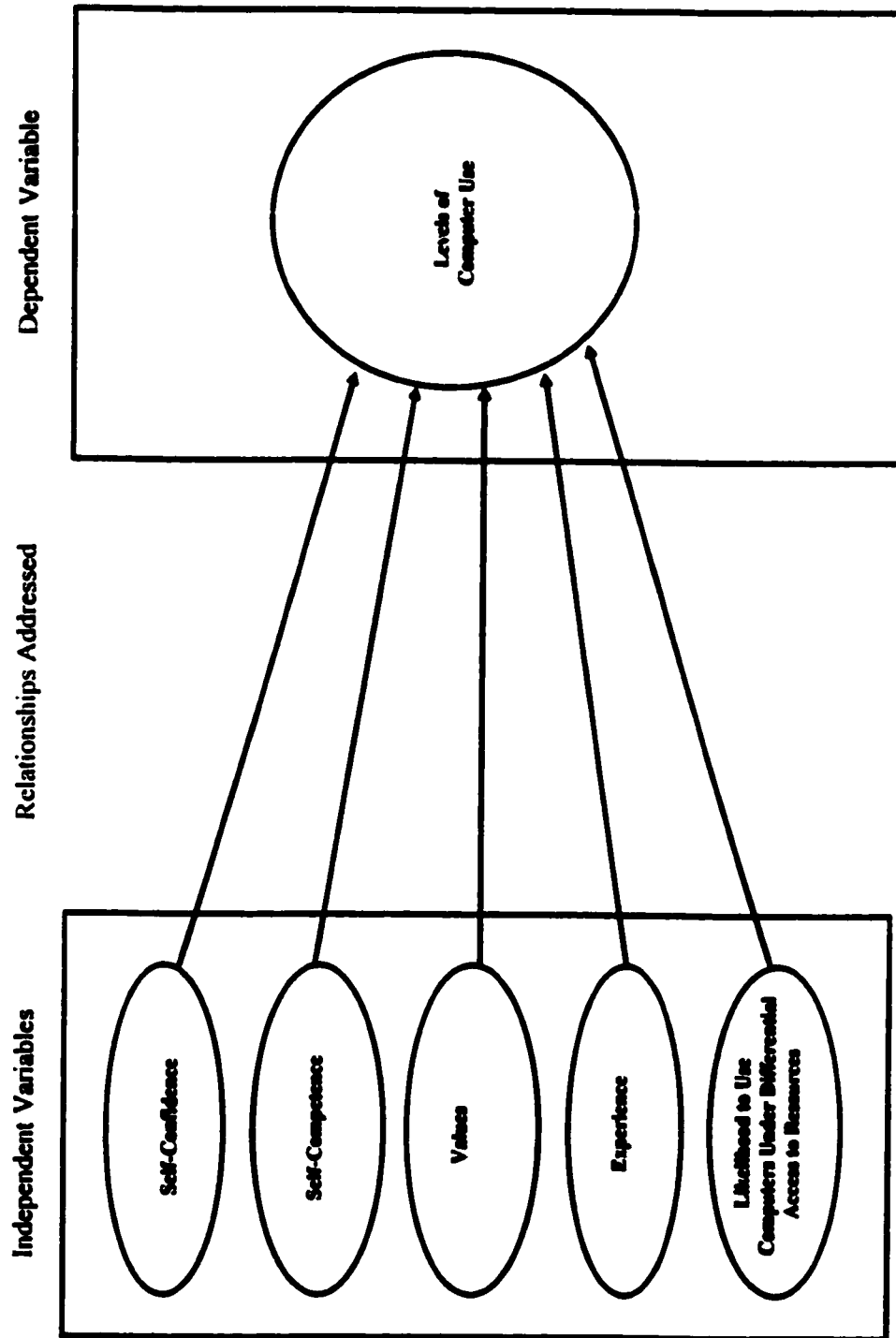


Figure 2. Conceptual model of present study.

being positively oriented towards educational computing by expressing confidence in using computers were examined. This study involved 54 teachers selected from a semi-urban community of Vancouver, British Colombia, and 89 student teachers enrolled in an introductory computer course at the University of British Colombia. The researcher surveyed these two groups using a questionnaire adapted from Stevens' (1982) "Computers in Education" survey to evaluate their beliefs toward the application of computers in education. Both groups were found to be reasonably comfortable around computers. Woodrow (1987) discovered that the majority of teachers (60%) felt confident in their ability to incorporate computers into their classroom practices, and thus reasoned that "as computers become more common in schools, their mere presence becomes less threatening" (p. 32). The responses from these two groups were then compared to the published responses of Stevens' (1982) questionnaire which was administered to a random sample of Nebraska teachers and student teachers. Upon comparing these results with Stevens' (1982) findings, Woodrow (1987) found that Stevens' (1982) teachers were less confident about adopting technology into their classrooms.

Research conducted by Rosen and Weil (1995) found similar results. These researchers assessed teachers' interaction with computers that resulted in feelings of both inability and lack of confidence, commonly known as technophobia. The sample consisted of 171 elementary, 117 secondary science, and 200 secondary humanities teachers in 54 schools across five urban school districts. Rosen and

Weil (1990) previously defined technophobia as including one or more of the following:

- (a) anxiety about present or future interactions with computers or computer-related technology;
- (b) negative global attitudes about computers, their operation, or their societal impact; or
- (c) specific negative cognitions or self-critical internal dialogues during actual computer interaction or when contemplating future computer interaction. (p. 276)

With the increased emphasis on computing in the schools, the researchers found that teachers continued to avoid using the technology that was available to them and their students. This avoidance was seen as being caused by the teachers' general discomfort of computers or their lack of self-confidence in using computers. Rosen and Weil (1995) concluded that many teachers were worried about using and dealing with computers in their schools. Although the Rosen and Weil (1995) study focused primarily on the lack of self-confidence as an explanation for teachers' low level of computer use, there was evidence that teachers who did not feel comfortable with computers may impart a mistrust of technology to their students either overtly or covertly through their actions or inactions.

Overall, these studies revealed that teacher beliefs toward computers,

specifically, self-confidence, may play an important role in the successful implementation of computers in education. Yet, another key finding was that simply placing more computers into the schools would not convince teachers to use them as learning tools (Rosen & Weil, 1995), but instead may cause teachers to feel less confident about the inclusion of computers in the classroom.

### Self-Competence

Research has shown that having more technology does not in itself persuade teachers to begin to use it effectively. In other words, an exceptional availability of computers is not necessarily matched by an exceptional use of computers (Marcinkiewicz, 1993/1994, 1994/1995, 1996; Rosen & Weil, 1990, 1995). This may be an indication that other variables contribute to a teacher's pursuit or avoidance of computer use. One such variable that has been investigated is self-competence. Self-competence has served as a measure of teachers' perceived capabilities to use computers effectively (Marcinkiewicz, 1993/1994, 1994/1995, 1996; Rosen & Weil, 1990, 1995; Stevens, 1982; Woodrow, 1987).

Marcinkiewicz (1993/1994) investigated self-competence as one of several independent variables that may possibly influence teachers' levels of computer use. The sample consisted of 170 elementary school teachers. The researcher found that teachers' perception of their ability to competently use computers for teaching was an initial indicator of teachers' future computer use. Marcinkiewicz (1993/1994) concluded that in order to fully integrate computers into teaching, the issue of

"what makes teachers want to -- or need to -- use [computers]" (p. 234) should be addressed. This statement was considered in a follow-up study.

In 1994/1995, Marcinkiewicz examined 170 teachers from four schools as well as 167 preservice teachers in order to investigate the relationships between several personal variables and teachers' level of computer use. Marcinkiewicz (1994/1995) discovered that the variable most closely related to teachers' computer use was perceived self-competence. Self-competence was also found to be highly related to achievement and learning situations. As such, the researcher suggested that computer integration should be considered an achievement and that teachers should be viewed as learners. Having identified a relationship between self-competence and computer use, Marcinkiewicz later conducted a longitudinal study to further test this finding.

In 1996, Marcinkiewicz conducted four studies: two with independent groups of practicing teachers and a group studied twice longitudinally. The latter group initially participated as preservice teachers then participated once again after one year of professional teaching. The purpose of these studies was to identify predictors of teachers' computer use. Marcinkiewicz (1996) found once again that self-competence was a strong predictor of computer use. The researcher further stated that teachers' motivation to use computers was embedded in the need as well as the appeal of feeling competent in using computer technology.

The findings from Marcinkiewicz's (1993/1994, 1994/1995, 1996) research

were corroborated by other studies (Rosen & Weil, 1990, 1995; Stevens, 1982). Stevens (1982) examined educators' perceptions of computers in education. This research was conducted in 1979 and then replicated in 1981. The researcher assessed the beliefs of 1,200 elementary and secondary teachers, student teachers, and university professors in Nebraska. Stevens (1982) discovered that none of the participants in either survey felt capable of using computers competently in teaching. Stevens (1982) thus concluded that this teacher perception may be a major obstacle in the implementation of computers in education. Similarly, Rosen and Weil (1990, 1995) revealed that the avoidance of technology may not change the belief system of teachers as they would never use computers on their own or with their students, thereby never challenging their beliefs about not being able to competently operate computers.

In contrast though, Woodrow (1987) found that since teachers were willing to incorporate computers into their classroom, the vast educational potential of the computer was beginning to be recognized. Yet, a key element from these works was that beliefs, particularly self-competence, should be evaluated both prior to and during the early stages of computer implementation in the schools (Stevens, 1982; Woodrow, 1987).

### **Perceived Value of Computers**

Value components of research models have incorporated individuals' goals for engaging in tasks and their beliefs about the importance, utility, or interest of a

task (Kellenberger, 1994, 1996; Pintrich, 1990). Essentially, one would be more likely to approach those tasks that are perceived to be valuable due to their high level of importance. This broad view of value-related beliefs has shaped several research studies related to educational computing (Kellenberger, 1994, 1996; Lumsden & Norris, 1985; Norris & Lumsden, 1984; Reed, 1986; Stevens, 1980, 1982; Wedman & Heller, 1984; Wedman, Heller, & Strathe, 1986; Woodrow, 1987).

Kellenberger (1994, 1996) investigated the relationship between preservice teachers' achievement- and value-related motivational beliefs about computers and their perceived computer self-efficacy in influencing and helping students in the area of computers as future teachers. The samples consisted of 222 Primary/Junior (grades K-6) preservice teachers enrolled in a teacher-training programme. The researcher discovered that most preservice teachers believed computers were quite valuable especially for their children, future students, and society. Kellenberger (1994, 1996) also found that both perceived past success and own value were significantly related to perceived computer self-efficacy. As a result, the researcher suggested that computer educators may wish to focus on the value of computers for teachers' own needs and their career.

This view was also shared by Lumsden and Norris (1985). Here, researchers surveyed 463 teachers, administrators, and staff members in 10 public schools in Texas. The beliefs of educators concerning the uses of computers in

educational environments were examined. The researchers reported that the majority of educators believed that computers were valuable tools that could be used to improve the quality of education and that computers should be used more frequently in schools. These educators also felt that all students should not only learn about computers but how to use them as problem-solving tools as well. Lumsden and Norris' (1985) findings thus indicated that teachers' values played an important role in how computers could be used in education. In support, Woodrow (1987) found that when teachers believed that computers could be used beneficially in all curricular areas, the idea of using the computer as a highly versatile tool could then be fostered.

In an earlier study, Norris and Lumsden (1984) sought to measure educators' beliefs toward computers by surveying 450 public school teachers in Texas. In general, the majority of participants felt that all teachers should know how to use computers in the classroom. However, the researchers discovered that educators preferred computers to have a function outside their experiential world of practice. In other words, teachers remained positive about computers as long as the computers were not in their classrooms. Norris and Lumsden (1984) concluded that when the suggestion was made that computers for classroom use were desirable, the proportion of educators expressing agreement dropped precipitously. Here, research has shown that teachers' value-related beliefs may either facilitate or undermine plans for the implementation of educational computing.



Research by Reed (1986) also stressed the importance of perceived value. A study involving 89 teachers from elementary, intermediate, middle, junior high, vocational, and high schools in a mid-Atlantic state centred on teachers' beliefs about how computers should be used in the classroom, computer misuses, and ways to improve computer use. The researcher discovered that the most often cited valuable uses for computers were to make students functional in society and the work force, enhance students' learning skills, and assist the teacher with classroom instruction. Responses to computer misuses were numerous. The most often cited responses were "playing games, [replacing] actual teaching, and using computers to keep students busy" (p. 76). Reed (1986) concluded that in order to successfully implement computers into the classroom, teachers should first value the computer as a teaching tool.

Stevens' (1980) first survey discovered that the majority of participants were receptive to the potential of using computers as instructional tools in the class. Yet, many educators were cautious and hesitant in making judgements about the value of instructional computing until more success was experienced in instructional uses of computers. In 1982, Stevens noticed a decided shift in views. The participants in the latter study exhibited a greater working knowledge of computer software and hardware, and as a result, more teachers perceived computers to be advantageous and beneficial for students in all disciplines. Thus, as educators become exposed to instructional computing, their perceived value of computers may also change.

Research conducted by Wedman and Heller (1984) supported Stevens' (1980, 1982) conclusion. A study involving 87 inservice teachers who were enrolled in a two credit-hour computer course at five different sites across the state of Iowa assessed the affective needs of a group of teachers as they began a computer inservice course (Wedman & Heller, 1984). The researchers discovered that teachers' concerns about educational computing were most intense in the areas of awareness, information, and personal concerns. Wedman and Heller (1984) defined these three concerns about computers as:

- (a) awareness - unconcerned about the innovation;
- (b) information - concerned about the general characteristics of the innovation; [and]
- (c) personal - concerned about the relationship between one's role and the demands of the innovation. (p. 34)

The findings also suggested that as teachers become experienced with computer technology their concerns may shift from the early, self-centred beliefs, to value-related beliefs that focus on the innovation itself and its impact on students. As this study only described teachers' concerns toward computers prior to entering an inservice program, Wedman, Heller, and Strathe (1986) decided to investigate these concerns one step further.

Wedman, Heller, and Strathe (1986) surveyed 91 classroom teachers who had voluntarily enrolled in a university-offered computer course for which the

teachers paid their own tuition. This course was offered at six different sites across a central mid-western state. The purpose of the study was twofold: (1) to identify teachers' beliefs, specifically their concerns, about educational computing, and (2) to describe the effect of an inservice program on these concerns. Both pre- and post-data were collected from all the participating teachers. Although the teachers varied in years of teaching experience and amount of computer experience, they were collectively receptive toward educational computing. Wedman, Heller, and Strathe (1986) also noted that if inservice programs fail to address teachers' concerns such as how to incorporate computers into teaching on a daily basis, then some teachers may opt to permanently direct their attention away from inservice education and perhaps even away from educational computing. Furthermore, Wedman, Heller, and Strathe (1986) corroborated Wedman and Heller's (1984) and Stevens' (1980, 1982) findings by stating that teachers' perceived value of computers may evolve as information about new computer uses, how those uses impact one's role, and how one works with others to incorporate such uses emerge.

In all of these studies, the concept "value" reflected the importance that a task such as using computers in education held for an individual. The perceived importance of integrating computers into the classroom was thus related to teachers' goal orientation (Pintrich, 1990). In other words, if the teacher's goals for education changed, then the importance of a given task such as using computers in the schools would vary accordingly.

### Computer Experience

Computers are more available in schools today than ever before. Yet, observers in most school settings have reported that while some teachers may use computers extensively with their students in their classes, others have chosen to make little or no use of computers (Cates & McNaul, 1993). Research has shown that computer experience among teachers vary and that exposure to an experience with the computer may either contribute to teachers' fear of computers or foster favourable beliefs about their use (Cates & McNaul, 1993; Gressard & Loyd, 1985; Honeyman & White, 1987; Lumsden & Norris, 1985; Rosen & Weil, 1990, 1995; Stevens, 1980, 1982; Woodrow, 1987).

A study by Cates and McNaul (1993) examined 107 7th- and 8th-grade teachers of learning disabled students. The amount and type of training that the teachers had completed, their beliefs toward computers, and their reported use of computers were measured. Teachers who reported having completed both more than three credit-hours of university course work and more than three contact-hours of inservice training expressed higher evaluations of their own levels of expertise, higher perceptions of comfort in working with computers, and higher opinions of the usefulness of computers than those who did not. In addition, these teachers used computers more frequently with students in the classroom than those respondents who only completed the lowest levels of such training. The researchers also noted that age and years of teaching experience were not

significant factors. Furthermore, inservice training and not university course work was the major influence on the variables studied. However when university course work accompanied more than three contact-hours of inservice training, teachers exhibited highly favourable beliefs toward computers and in turn, used computers more frequently. Conversely, when university course work was not accompanied by more than three contact-hours of inservice training, teachers reported less frequent use of computers and less favourable beliefs toward their use. Overall, the results strongly suggest that inservice training contributed significantly to the use and the establishment of favourable beliefs toward computers by teachers.

Research conducted by Gressard and Loyd (1985) supported this finding. This research study involved 41 elementary, junior high, and high school teachers, from three school systems in Virginia, who were enrolled in a staff development program. The effects of age and participation in a computer-related staff development program on teachers' beliefs were investigated. Although age was not found to be a contributing factor to the beliefs of teachers, staff development programs were found to be related to improved teacher perceptions of computers. Gressard and Loyd (1985) summarized that there was value in providing computer instruction and experience to teachers of all ages because it may be the most effective way to alleviate teachers' fear of computers and to improve their perceptions of computers in education.

This view was also shared by Honeyman and White (1987). These

researchers conducted a two-year study which involved teachers and school administrators enrolled in an introductory computer applications course. Age, gender, previous experience, and time in contact with a computer were investigated to determine the extent to which these factors influenced levels of anxiety. No relationship was found between the current occupational status, age, or gender of the group and learning how to use the computer or levels of anxiety. However, participants who had previous computer knowledge exhibited lower initial levels of anxiety in comparison to those who did not. Honeyman and White (1987) further reported that while the individuals with previous computer experience maintained lower anxiety levels than their counterparts throughout the course, participants without experience had significant reductions in their levels of anxiety by the end of the computer course. Essentially, this study showed that the lowering of an individual's anxiety level occurred over time and that the timing of such a change differed with the levels of previous computer experience possessed by the participants. The researchers concluded that without adequate time in contact with the computer, levels of anxiety would not lessen but instead heighten.

An argument against this experiential approach was held by Rosen and Weil (1990, 1995). According to these researchers, teachers' fears of computers were not due to their lack of computer experience, but instead their avoidance of technology. Clearly, computer experience may not be the solution for teachers frightened by computers as it may only make them feel more uncomfortable (Rosen & Weil,

1990, 1995).

Another dimension of computer experience is teachers' interest in or need for computer training in general. Several studies have investigated this issue and found that teachers perceived inservice computer training to be important (Lumsden & Norris, 1985; Stevens, 1980, 1982; Woodrow, 1987). In the study conducted by Lumsden and Norris (1985), the vast majority of teachers exhibited a desire to attend inservice training that focused on the uses of computers in the classroom because they believed that computers could improve the quality of education. Moreover, despite discovering that half of the teachers in the Stevens' (1980) first survey were not interested in receiving any computer training, Stevens (1982) noted that the views of teachers had changed when the second survey was conducted. Thus, teachers expressed a growing desire to gain new computer skills in order to respond to the technological needs of their students. Woodrow's (1987) study further confirmed Stevens' (1980, 1982) and Lumsden and Norris' (1985) findings. All of the teachers examined by Woodrow (1987) expressed the need for computer training because they wanted to properly qualify themselves to use computers in their classrooms.

Overall, the last two decades has been a time of experimentation and learning for teachers wanting to integrate the use of computers into the classroom. Some teachers went ahead and used computers, while others gave up. Many of the teachers who chose not to use computers did so either because they lacked the

expertise or experience, or because they were unconvinced that computers could be useful in teaching (Zammit, 1992).

### **Perceived Likelihood of Using Computers under Differential Access to Resources**

Researchers have identified acquisition or access to computer hardware, software, and support as important factors affecting teachers' utilization of computers in their teaching (Kellenberger, 1994, 1997; Reed, 1986; Zammit, 1992). Kellenberger's (1994, 1997) work examined the effectiveness of experience-related and value-related factors in predicting preservice teachers' perceived computer use with a class under differential access to four resources: computers, programs, a computer-knowledgeable individual, and an individual to initially teach students how to use a computer. Kellenberger (1994, 1997) found that the value of computers for preservice teachers' career and future students were the best predictors of perceived computer use under differential access to the first three resources. Yet, the value for own needs and future students were the best predictors of perceived computer use associated with the fourth resource.

Similar results were found in research conducted by Zammit (1992). Here, Zammit (1992) investigated factors that were perceived by teachers to facilitate or hinder the use of computers in schools. The sample was made up of 112 secondary school computer users (teachers who used computers with their students as part of their teaching at least once a term) and 250 non-users. Computer users rated access to computers and software as the two most important factors out of



nine that encouraged them to start using computers. Support from computer coordinators and other teachers were rated fifth and sixth respectively. Non-users, on the other hand, identified the following three factors as having encouraged them to begin using computers in their teaching: (1) more computers located in the departments, (2) more time to discuss ideas with other teachers on the use of computers in their subject area, and (3) more inservice training courses. The two conditions that prevented both the computer users and the non-users from using computers in their classrooms were difficulties of access to the computer room and not having sufficient time to review software adequately. Zammit (1992) concluded that teachers required better access to hardware, software, and trained personnel in order to effectively use computers in the schools. In support, Reed (1986) found that when teachers were asked about how computer instruction could be improved in the schools, the most often cited answers were "provide more machines, more software, separate lab facility, computer teacher/staff, and more teacher training" (p. 77).

Overall, research has confirmed that access to computer hardware, software, and support were important incentives for using computers in education. Yet, paradoxically, access may become more difficult as more teachers become interested in using computers with their students (Zammit, 1992).

### Levels of Computer Use

Based on the belief that computers improve the quality of teaching, many

**schools have made computers available to teachers and students. Despite the increased availability of computers in education, many teachers still appear not to use computers as much as might be expected. This quandary has been the subject of several research studies (Larner & Timberlake, 1995; Marcinkiewicz, 1993/1994, 1994/1995, 1996; Rosen & Weil, 1990, 1995; Zammit, 1992).**

**Larner and Timberlake (1995) investigated 74 teachers from four public elementary schools across two school districts in central Virginia to determine the degree to which knowledge, anxiety, personal and professional beliefs, school support, and school resources/set-up affected teachers' computer use. The researchers reasoned that knowledge was the most critical variable and thus decided to concentrate on teachers with limited computer knowledge in order to examine the relative strength of the correlations of the other five variables with computer use. Larner and Timberlake (1995) discovered that of the remaining five variables, only anxiety proved to be statistically significant. In other words, level of anxiety was strongly correlated with computer use for teachers with limited computer knowledge. Essentially, anxiety had the largest impact on determining teachers' levels of computer use. In support, Rosen and Weil (1990, 1995) stated that when teachers were less than comfortable with computer technology, they did not use computers and sometimes even avoided them altogether.**

**Marcinkiewicz's (1993/1994, 1994/1995, 1996) research, outlined earlier, categorized teachers' computer use into three levels: non-use, utilization, and**

integration. These levels were based on the teacher's involvement with computers in the classroom. Marcinkiewicz (1993/1994, 1994/1995, 1996) found that, despite increased availability and support for computers, relatively few teachers integrated computers into their teaching. The researcher also discovered that in comparison to preservice teachers, teachers who had been working for several years were less likely to adopt computers for use in their classroom. Although levels of computer use among teachers were not high, preservice teachers' expectations of computer use were very high. However, after one year of professional teaching, preservice teachers' expectations dropped. The researcher concluded that practicing teachers would need to be extremely motivated to integrate computers into their teaching.

Likewise, Zammit (1992) stated that the availability of or access to computers should be considered as a motivator for teachers' computer use and not as a factor determining this use. The researcher further noted that in order to encourage teachers to use computers in an educational setting, administrators, colleagues, and the profession as whole would have to model computer use and provide support, particularly if computer use was to be widespread.

## **Methodology**

### **Sample**

The sample for this study consisted of 80 inservice teachers enrolled at the Faculty of Education, University of Windsor, during the 1997/1998 academic year. Teachers registered in the computer inservice course were excluded from the study to avoid sampling bias and allow greater generalization of the results.

As might be expected, there were more female (87.3%) participants than male (12.7%). The age of the teachers ranged from 23 to 53 years with the mean age being 29.9 years. In addition, the mean number of years of teaching experience was 3.5 years. Occupational status was grouped into the following six categories: teachers (63.3%); administrators (1.3%); supply teachers (5.1%); others working in the field of Education (2.5%); preservice education graduates from the past academic year (5.1%); and unemployed teachers (22.8%).

### **Research Questions**

The following research questions were investigated:

**Question 1:** Is there a relationship between perceived self-confidence among inservice teachers and levels of computer use?

**Question 2:** Is there a relationship between perceived self-competence among inservice teachers and levels of computer use?

**Question 3:** Is there a relationship between perceived value of computers among inservice teachers and levels of computer use?

**Question 4:** Is there a relationship between computer experience among inservice teachers and levels of computer use?

**Question 5:** Is there a relationship between perceived likelihood of using computers under differential access to resources among inservice teachers and levels of computer use?

### **Instrumentation**

A questionnaire developed by the researcher served as the data collection instrument (see Appendix A). Respondents required approximately 15 minutes to complete the survey. The instrument consisted of seven parts: demographics, self-confidence, self-competence, perceived value of computers, computer experience, perceived likelihood of using computers under differential access to resources, and levels of computer use. All items were measured on a 5-point Likert-type scale except where noted and numerically coded from 1 to 5.

#### **Demographics.**

The information in this section, presented earlier, asked respondents to indicate their gender, age, number of years of teaching experience, and occupational status.

#### **Self-confidence.**

Self-confidence may be described as feeling self-reliant or certain. This section consisted of five items that ranged from "not confident" to "very confident". The first three items asked participants to indicate their self-confidence in using a

computer: in general, for personal needs, and for work. The last two items asked subjects to indicate their self-confidence in gaining new computer knowledge and skills. These two items were summed for a resultant score ranging from 2 to 10.

#### **Self-competence.**

Self-competence may be described as feeling qualified, capable, or effective. This section consisted of three items that ranged from "not competent" to "very competent". Here, inservice teachers were asked to indicate their self-competence in: (1) using a computer to assist them with their own teaching needs that were not directly related to student use, (2) using a computer to individualize students' needs, and (3) integrating computers into classroom instruction.

#### **Perceived value of computers.**

These seven items consisted of value components related to teachers' "choice of activities as well as [their] persistence at a task" (Pintrich, 1990, p. 842). The first four items asked inservice teachers how valuable computers were for: their own personal needs, creating instructional support materials, classroom instruction in general, and individualizing students' needs (adapted from Kellenberger, 1994). The three remaining items asked teachers how valuable computers were for improving students': needs, development of various skills, and motivation to learn. All items ranged from "not valuable" to "very valuable".

#### **Computer experience.**

This section consisted of five items associated with past computer

experience. The first item asked teachers to indicate how much experience they felt they had using a computer (adapted from Kellenberger, 1994). The scale ranged from "no experience" to "a lot of experience". The second item asked subjects to categorize their computer use over the past two years as either decreasing, remaining the same, or increasing. The third item asked inservice teachers to indicate whether they owned a home computer. The final two items asked teachers to indicate over the past two years how many computer-related university credit hours they had taken and how many hours they had spent taking workshops related to computers (adapted from Cates & McNaul, 1993).

**Perceived likelihood of using computers under differential access to resources.**

This section of the questionnaire consisted of 16 items. The first fourteen items were grouped into three subsections based on the perceived likelihood of inservice teachers using computers with their class on a regular basis under differential access to: computers, programs, and a computer-knowledgeable individual (adapted from Kellenberger, 1994). Items were based on scenarios believed to best represent the kinds of access inservice teachers faced in their schools. The scale ranged from "not likely" to "very likely". Items in each subsection were summed resulting in three scores, one for each of the aforementioned resources.

Items in the first subsection asked inservice teachers to indicate the

likelihood of using computers on a regular basis if: (1) they had only one computer in their classroom, (2) they had a few computers in their classroom, (3) they had to reserve computer equipment for use in their classroom, (4) they had a computer lab in their school, and (5) they had to book a time for their students to use the computers in the computer lab. The summed score ranged from 5 to 25.

In the second subsection, subjects were asked to indicate the likelihood they would use computers on a regular basis if: (1) they had only a few computer programs in their classroom, (2) they had many programs in their classroom, (3) they had many computer programs available at their school, (4) they had to reserve computer programs through their school, and (5) they had to book programs through the board office. The score in this subsection also ranged from 5 to 25.

Similarly, items in the third subsection asked teachers to indicate the likelihood they would use a computer on a regular basis if: (1) they had a computer-knowledgeable individual in their classroom, (2) the nearest computer-knowledgeable teacher was in the room right next door to their class, (3) the nearest computer-knowledgeable assistant was elsewhere in their school, and (4) the nearest computer-knowledgeable individual resided at the board office. The resultant score ranged from 4 to 20.

The remaining two items were for information purposes only. Here, subjects were asked to indicate how many computers they had in their classroom and whether they had a computer lab in their school.



### **Levels of computer use.**

The initial item in this section asked inservice teachers whether they used a computer at all. If subjects responded "yes", they were asked to complete the remainder of the section. This last part consisted of 12 items in three subsections that focused on how often teachers used a computer for: their own use, their teaching career, and student learning (adapted from Kellenberger, 1994). Items in each of these three subsections were based on scenarios believed to best represent the various ways in which inservice teachers used computers. The scale ranged from "not often" to "very often". In addition, the items in each subsection were summed resulting in three scores, one for each of the aforementioned levels of computer use.

Items related to own use asked subjects to indicate how often they used a computer for: (1) leisure, (2) hobbies/interests, and (3) personal needs. The resultant score ranged from 3 to 15.

Items related to subjects' teaching career asked how often they used a computer to: (1) prepare instructional materials, (2) prepare newsletters to parents, (3) prepare school-related reports/schedules, (4) evaluate software/hardware, and (5) communicate with other teachers (adapted from Kellenberger, 1994). The score from this subsection ranged from 5 to 25.

In relation to levels of computer use associated with student learning, inservice teachers were asked to indicate how often they used a computer for: (1)

class demonstrations, (2) educational games, (3) individualizing students' needs, and (4) integrated student activities (adapted from Kellenberger, 1994). The summed score ranged from 4 to 20.

### **Procedures**

Inservice instructors were contacted by the researcher to confirm their permission to gather data in their class. The questionnaire with an appropriate cover letter (see Appendix A) was then distributed to the inservice teachers by the researcher during each class visit. The inventory was administered during the end of September and at the beginning of October in 1997. Although participation in the study was voluntary, the response rate was 93%. Anonymity was guaranteed. Inservice teachers were asked to answer the questions honestly and to leave blank those questions that they did not wish to answer. The researcher was available for any questions during the data collection.

### **Research Design and Analysis**

Multivariate analysis of variance (MANOVA) and the Pearson correlation coefficient served as the primary statistical procedures. For the MANOVA analysis, each of the individual items within each group of independent variables were used separately as the independent variable. For the Pearson correlations, summed scores of levels of computer use were used. The MANOVAs performed in this study are detailed in Table 1. The Pearson correlations are presented in Table 2. The statistical analysis was done on a personal computer using the SPSS

Table 1

Summary of MANOVAs Performed

MANOVAs		
Independent Variable		Dependent Variable (Level of Computer Use Items)
Concept	Item	
Self-Confidence	<ul style="list-style-type: none"> <li>•General</li> <li>•Personal Needs</li> <li>•Work</li> <li>•Gain New Knowledge and Skills</li> </ul>	Own Use, Teaching Use, Student Learning Own Use Teaching Use, Student Learning Own Use, Teaching Use, Student Learning
Self-Competence	<ul style="list-style-type: none"> <li>•Own Teaching Needs</li> <li>•Individualize Students' Needs</li> <li>•Integrate Computers into Instruction</li> </ul>	Teaching Use Student Learning  Student Learning
Perceived Value of Computers	<ul style="list-style-type: none"> <li>•Personal Needs</li> <li>•Create Instructional Support Materials</li> <li>•Classroom Instruction in General</li> <li>•Individualize Students' Needs</li> <li>•Improve Students' Knowledge</li> <li>•Improve Students' Development of Skills</li> <li>•Improve Students' Motivation</li> </ul>	Own Use Teaching Use  Student Learning  Student Learning  Student Learning  Student Learning  Student Learning
Computer Experience	<ul style="list-style-type: none"> <li>•Experience Using a Computer</li> <li>•Computer Use Over the Past 2 Years</li> <li>•Own a Computer</li> </ul>	Own Use, Teaching Use, Student Learning  Own Use, Teaching Use, Student Learning  Own Use, Teaching Use, Student Learning

Table 2

Summary of Pearson Correlations Performed

Pearson Correlations		
Independent Variable		Dependent Variable (Level of Computer Use Scores)
Concept	Item	
Computer Experience	•Computer-Related University Credit Hours	Summed Scores of Own Use, Teaching Use, and Student Learning
	•Computer-Related Workshop Hours	Summed Scores of Own Use, Teaching Use, and Student Learning
Perceived Likelihood of Using Computers under Differential Access to Resources	•Summed Score of Access to Computers	Summed Score of Teaching Use
	•Summed Score of Access to Programs	Summed Score of Teaching Use
	•Summed Score of Access to a Computer-Knowledgeable Individual	Summed Score of Teaching Use

computer package. The level of significance chosen for this study was 1%, however those relationships that reached the 5% level are also indicated in the results.

## **Results**

### **Levels of Computer Use**

All but one respondent (98.7%) indicated that they had used a computer. Since only one individual did not use a computer, this respondent was excluded from any statistical tests.

The means and standard deviations for levels of computer use are presented in Table 3. Although inservice teachers used computers somewhat often for each of the three levels of use investigated, they appear to have used computers more for their "own use" and "teaching" compared to using the computer for "student learning". For "own use", inservice teachers appear to have used computers more for "personal needs" than for "leisure" and "hobbies/interests". In relation to "teaching use", subjects appear to have used a computer more for the preparation of "reports/schedules", "instructional materials", and "newsletters to parents" than for "communication with other teachers" and "software/hardware evaluation". For "student learning", teachers appear to have used computers more for "educational games" compared to using the computer for "integrated student activities", "individualizing students' needs", and "class demonstrations".

### **Self-Confidence**

In general, inservice teachers were somewhat confident in using computers and gaining new computer knowledge and skills (see Table 4 for means and standard deviations). Specifically, teachers appear to have been most self-confident

Table 3

Means and Standard Deviations for Levels of Computer Use

Level of Computer Use	Item	M	SD
Own Use	Leisure	3.23	1.45
	Hobbies/Interests	3.14	1.34
	Personal Needs	3.75	1.14
Teaching Use	Instr. Materials	3.53	1.22
	Newsletters	3.53	1.43
	Reports/Schedules	3.76	1.22
	Software/Hardware	2.39	1.21
	Comm. with Teachers	2.49	1.46
Student Learning	Class Demos	2.38	1.22
	Educational Games	3.32	1.34
	Indiv. Stds. Needs	2.94	1.25
	Integrated Std. Activ.	2.95	1.31

Note. N = 79.

Table 4

Means, Standard Deviations, and MANOVA and Univariate results for Self-Confidence

	MANOVA				Univariate						
Indep Var Item	Dep Var Group	Approx F	Hypoth Error df	p	Dep Var Item	Hypoth SS	Error SS	Hypoth MS	Error MS	F	p
General <i>M</i> = 3.63 <i>SD</i> = .96	Own Use	2.69	9.00	.00	Leisure	31.97	131.92	10.66	1.75	6.06	.00
					Hobbies/Interests	28.30	113.16	9.43	1.50	6.25	.00
					Personal Needs	17.23	85.19	5.74	1.13	5.05	.00
	Teaching Use	2.39	20.00	.00	Instr. Materials	27.98	76.72	6.99	1.23	5.65	.00
Personal Needs <i>M</i> = 4.04 <i>SD</i> = .90	Own Use	2.91	9.00	.00	Newsletters	29.89	106.75	7.47	1.72	4.34	.00
					Reports/Schedules	29.40	70.77	7.35	1.14	6.44	.00
					Software/Hardware	6.21	91.90	1.55	1.48	1.04	.00
	Student Learning	0.81	16.00	.00	Comm. with Teachers	33.50	107.15	8.37	1.72	4.84	.00
Work <i>M</i> = 3.71 <i>SD</i> = .99	Own Use	2.16	20.00	.00	Leisure	32.78	131.11	10.93	1.74	6.25	.00
					Hobbies/Interests	27.14	114.32	9.04	1.52	5.93	.00
					Personal Needs	26.37	76.05	8.79	1.01	8.67	.00
	Teaching Use	2.16	20.00	.00	Instr. Materials	33.15	65.09	8.29	1.06	7.76	.00
Gain New Knowledge And Skills <i>M</i> = 3.76 <i>SD</i> = .95	Own Use	1.89	18.00	.00	Newsletters	19.14	110.97	4.78	1.81	2.63	.00
					Reports/Schedules	35.78	56.65	8.94	0.92	9.63	.00
					Software/Hardware	9.06	87.05	2.26	1.42	1.58	.00
	Student Learning	1.27	24.00	.00	Comm. with Teachers	33.07	105.18	8.26	1.72	4.79	.00

Note. \*  $p < .05$ , \*\*  $p < .01$ .



in using a computer for "personal needs".

MANOVA and, where appropriate, univariate results associated with perceived self-confidence are also presented in Table 4. For MANOVA results, approximate F value of Pillai's Trace, hypothesis degrees of freedom, error degrees of freedom, and level of significance are indicated. For univariate results, hypothesis sum-of-squares, error sum-of-squares, hypothesis mean squares, error mean squares, F value, and level of significance are indicated.

Although none of the self-confidence items tested were significantly related to "student learning", nonetheless three of the four self-confidence items were significantly related to other levels of use. As can be seen, "general confidence" in using a computer was significantly related to "own use" ( $p < .01$ ) and "teaching use" ( $p < .01$ ) but not to "student learning" ( $p > .05$ ). Univariate results indicated that "general confidence" was significantly related to all items of both "own use" ( $p < .01$ ) and "teaching use" ( $p < .01$ ) except for "software/hardware evaluation" associated with "teaching use" ( $p > .05$ ). Confidence in using a computer for "personal needs" was significantly related to "own use" ( $p < .01$ ) overall and all individual items as well ( $p < .01$ ). Confidence in using a computer for "work" was significantly related to "teaching use" ( $p < .01$ ) but, again, not to "student learning" ( $p > .05$ ). Similar to "general confidence", confidence in using a computer for "work" was significantly related to all items associated with "teaching use" ( $p < .01$ ) except "software/hardware evaluation" ( $p > .05$ ). "Newsletters to parents",

however, only reached the 5% level. Interestingly, the summed score of confidence in "gaining new computer knowledge and skills" was not significantly related to any of the three groups of dependent variables ( $p > .05$ ).

### Self-Competence

The means and standard deviations for the self-competence items are presented in Table 5. Although inservice teachers were somewhat competent in using a computer, they appear to have felt much more self-competent using a computer for their "own teaching needs" than for "individualizing students' needs" or "integrating computers into instruction".

Overall, each of the self-competence items were significantly related to the tested levels of computer use at only the 5% level (see Table 5). Univariate results indicated that "own teaching needs" was significantly related to "instructional materials", "reports/schedules", and "communication with teachers" at the 1% level, "software/hardware evaluation" at the 5% level, while "newsletters to parents" was not significant ( $p > .05$ ). Competence in using a computer to "individualize students' needs" was significantly related to all "student learning" items at the 1% level. Competence in "integrating computers into instruction" was significantly related to all "student learning" items as well except that "educational games" and "integrated student activities" only reached the 5% level.

### Perceived Value of Computers

In general, inservice teachers perceived computers to be very valuable (see

Table 5

Means, Standard Deviations, and MANOVA and Univariate results for Self-Competence

Indep Var Item	MANOVA			Univariate					
	Dep Var Group	F	Approx df	Hypoth df	Error df	F	p	Hypoth SS	Error SS
Own Teaching Needs  M = 3.66 SD = .99	Teaching Use	1.89	20.00	244.00	•				
Individualize Students' Needs M = 2.94 SD = 1.10	Student Learning	1.99	16.00	240.00	•				
Integrate Computers Into Instruction M = 3.13 SD = 1.09	Student Learning	1.99	16.00	244.00	•				

Note. •  $p < .05$ , ••  $p < .01$ .

Table 6 for means and standard deviations). Specifically, teachers perceived computers to be particularly valuable for "personal needs", "creating instructional support materials", "improving students' knowledge", and "improving students' motivation".

Perceived value items were not only significantly related to "own use" and "teaching use" at the 1% level like some self-confidence items, but to "student learning" as well (see Table 6). Perceived value of computers for "personal needs" was significantly related to "own use" overall and all individual items at the 1% level. Although perceived value of computers for "creating instructional support materials" was significantly related to "teaching use" ( $p < .01$ ), univariate results varied. Here, perceived value of computers for "creating instructional support materials" was significantly related to "instructional materials", "reports/schedules", and "communication with teachers" at the 1% level, "newsletters to parents" at the 5% level, while again "software/hardware evaluation" was not significant ( $p > .05$ ). Both perceived value of computers for "classroom instruction in general" ( $p < .01$ ) and "improving students' development of skills" ( $p < .05$ ) were significantly related to "student learning" overall and all individual items as well ( $p < .01$ ) except that "improving students' development of skills" with "class demonstrations" only reached the 5% level. Interestingly, perceived value of computers for "individualizing students' needs", "improving students' knowledge", and "improving students' motivation" were not significantly related to "student learning" ( $p > .05$ ).

Table 6

Means, Standard Deviations, and MANOVA and Univariate results for Perceived Value of Computers

		MANOVA				Univariate						
Dep Var Group	Dep Var Item	Approx F	df	Error df	p	Dep Var Item	Hypoth SS	Error SS	Hypoth MS	Error MS	F	p
Personal Needs M = 3.93 SD = 1.04	Own Use	4.22	12.00	222.00	**	Leisure Hobbies/Interests	36.81	127.00	9.20	1.71	5.36	**
						Personal Needs	50.58	51.85	12.64	0.70	18.04	**
Grade Instructional Support Materials M = 3.08 SD = .98	Teaching Use	2.08	20.00	244.00	**	Instur. Materials Newsletters	36.82	68.29	9.08	1.18	8.12	**
						Reports/Schedules Software/Hardware	23.81	76.36	5.95	1.23	4.83	**
						Comm. with Teachers	6.85	91.26	1.71	1.47	1.16	**
Classroom Instruction In General M = 3.28 SD = .89	Student Learning	2.37	16.00	244.00	**	Class Room	35.39	62.83	8.87	1.81	8.72	**
						Educational Games Indiv. Sds. Needs	23.96	92.35	5.99	1.51	3.95	**
						Integrated Std. Activ.	23.74	78.01	5.93	1.27	4.64	**
Students' Needs M = 3.43 SD = 1.03	Student Learning	1.33	16.00	244.00								
Improve Students' Knowledge M = 3.04 SD = .99	Student Learning	0.97	20.00	240.00								
Improve Students' Development Of Skills M = 3.68 SD = .94	Student Learning	1.94	16.00	244.00	*	Class Room	17.63	79.90	4.40	1.31	3.36	*
						Educational Games Indiv. Sds. Needs	33.63	82.69	8.40	1.35	6.30	**
						Integrated Std. Activ.	20.65	81.10	5.16	1.33	3.88	**
Improve Students' Motivation M = 4.04 SD = .94	Student Learning	1.03	16.00	244.00								

Note. \*  $p < .05$ , \*\*  $p < .01$ .

### **Computer Experience**

The means, standard deviations, and frequencies for computer experience items are shown in Table 7. Inservice teachers perceived themselves to have some "experience using a computer". Yet, 72.5% of the respondents categorized their "computer use over the past 2 years" as "increasing", 22.5% as "remaining the same", and only 5.0% as "decreasing". The majority of inservice teachers (83.8%) indicated that they "owned a computer".

Not only did none of the MANOVAs associated with computer experience reach the 1% level, but no significant relationships were found for "student learning" either (see Table 7). "Experience using a computer" was significantly related to "own use" and "teaching use" at only the 5% level, while "student learning" was not significant at all ( $p > .05$ ). Univariate results indicated that "experience using a computer" was significantly related to all individual items of "own use" ( $p < .01$ ). From the univariate results associated with "teaching use", "experience using a computer" was significantly related to "instructional materials" and "reports/schedules" at the 1% level, "communication with teachers" at the 5% level, while "newsletters to parents" and "software/hardware evaluation" were not significant ( $p > .05$ ). The change in "computer use over the past 2 years" among inservice teachers was significantly related to "own use" at the 5% level but not to "teaching use" or "student learning" ( $p > .05$ ). From the univariate results associated with "own use", this change in "computer use over the past 2 years" was

Table 7

Means, Standard Deviations, Frequencies, and MANOVA and Univariate results for Computer Experience

Indep Var Item	MANOVA					Univariate						
	Dep Var Group	Approx F	Hypoth df	Error df	p	Dep Var Item	Hypoth SS	Error SS	Hypoth MS	Error MS	F	p
Experience Using A Computer M = 3.61 SD = .78	Own Use	2.48	9.00	216.00	*	Leisure	26.44	136.75	8.81	1.89	4.64	**
						Hobbies/Interests	29.63	185.77	9.87	1.46	6.72	**
						Personal Needs	21.98	79.29	7.38	1.10	6.62	**
	Teaching Use	1.98	15.00	174.00	*	Instr. Materials	21.98	88.02	7.32	1.33	5.49	**
Computer Use Over The Past 2 Years						Newsletters	9.27	118.47	3.89	1.97	1.56	
						Reports/Schedules	19.33	75.68	6.44	1.26	5.11	**
						Software/Hardware	4.96	84.27	1.65	1.40	1.17	
	Student Learning	0.65	12.00	174.00		Comm. with Teachers	22.27	115.47	7.42	1.92	3.85	*
Decreasing-8.8% Remaining the same-32.8% Increasing-72.5%	Own Use	2.73	6.00	158.00	*	Leisure	26.38	137.51	13.19	1.88	7.29	**
						Hobbies/Interests	13.48	128.86	6.78	1.68	3.97	*
						Personal Needs	2.42	188.88	1.31	1.31	0.92	
	Teaching Use	1.26	10.00	122.00								
Own A Computer 1%-0.0% No-14.3%	Student Learning	1.84	8.00	122.00								
	Own Use	2.19	3.00	75.00								
	Teaching Use	1.94	5.00	61.00								
	Student Learning	0.62	4.00	61.00								

Note. \*  $p < .05$ . \*\*  $p < .01$ .

significantly related to "leisure" at the 1% level, "hobbies/interests" at the 5% level, while "personal needs" was not significant ( $p > .05$ ). Interestingly, "owning a computer" was not significantly related to any of the three groups of dependent variables ( $p > .05$ ).

Overall, inservice teachers reported having completed some "computer-related university credit hours" ( $M = 4.41$ ,  $SD = 11.88$ ) and "computer-related workshop hours" ( $M = 3.84$ ,  $SD = 10.65$ ) in the past 2 years. The Pearson correlation coefficient was used to determine whether the amount of computer-related university credit hours and computer-related workshop hours taken by inservice teachers over the past 2 years were significantly related to levels of computer use scores. "Computer-related university credit hours" was not significantly related to the summed scores of any of the three groups of dependent variables ( $r_{own\ use} = .056$ ,  $p > .05$ ;  $r_{teaching\ use} = .215$ ,  $p > .05$ ;  $r_{student\ learning} = .149$ ,  $p > .05$ ). However, "computer-related workshop hours" was significantly and positively related to the summed scores of both "teaching use" ( $r = .312$ ) and "student learning" ( $r = .313$ ) at the 5% level, but not to the summed score of "own use" ( $r = .214$ ,  $p > .05$ ).

#### Perceived Likelihood of Using Computers under Differential Access to Resources

The mean number of computers in the classroom was only 1.47. Yet, 80.4% of the respondents had a computer lab in their school.

In general, inservice teachers were somewhat likely to use computers under



differential access to all three resources (see Table 8 for means and standard deviations). Specifically, teachers appear to have been most likely to use computers when they "had a computer lab in their school". Inservice teachers were very likely to use computers when "many programs were available at their school" or "in their classroom", but this likelihood appears to have dropped considerably if they had only "a few programs in their classroom" or had to "reserve programs through their school" or "book programs through their board office". Furthermore, teachers appear to have been much more likely to use computers when they had "a computer-knowledgeable individual in their classroom" than if the nearest computer-knowledgeable individual was outside their classroom.

The Pearson correlation coefficient was used to determine whether the sum of the scores related to differential access to computers, programs, and a computer-knowledgeable individual were significantly correlated with inservice teachers' levels of computer use scores. The summed scores of "access to computers" ( $r = .392$ ) and "access to programs" ( $r = .406$ ) were significantly and positively related to the summed score of "teaching use" at the 1% level, while the summed score of "access to a computer-knowledgeable individual" ( $r = .292$ ) with the summed score of "teaching use" was significant at only the 5% level.

Table 8

Means and Standard Deviations for Perceived Likelihood of Using Computers under Differential Access to Resources

Differential Access to Resources	Item	M	SD
Computers	•Only One Computer In Classroom	2.75	1.32
	•A Few Computers In Classroom	3.46	1.10
	•Reserve Computers For Use In Classroom	2.68	1.14
	•Computer Lab In School	4.06	.97
	•Book A Time For Students To Use Computers In The Computer Lab	3.62	1.11
Programs	•A Few Programs In Classroom	2.78	.96
	•Many Programs In Classroom	3.99	.81
	•Many Programs Available At School	4.03	.85
	•Reserve Programs Through School	3.11	1.03
	•Book Programs Through Board Office	2.48	1.16
Computer-Knowledgeable Individual	•Individual In Classroom	4.08	.83
	•Nearest Individual In Room Right Next Door To Classroom	3.49	.99
	•Nearest Individual Elsewhere In School	2.96	.96
	•Nearest Individual At Board Office	1.96	1.01

Note. N = 80.

## **Discussion**

The purpose of this study was to investigate inservice teachers' computer use. Specifically, this study investigated the relationship between inservice teachers' beliefs about computers and their levels of computer use. Unlike many previous research studies (e.g., Kellenberger, 1994, 1996, 1997; Marcinkiewicz, 1993/1994, 1994/1995, 1996; Woodrow, 1987), the conceptual model of the present study focused entirely on levels of computer use as the only dependent variable.

In this study, teacher beliefs were constructed from five measures: self-confidence, self-competence, perceived value of computers, computer experience, and perceived likelihood of using computers under differential access to computers, programs, and a computer-knowledgeable individual. Levels of computer use were subdivided into three areas for which computers would be used: personal, teaching, and student learning.

Since the chosen level of significance was 1%, the discussion will focus on those relationships that reached this level of significance. Below is a discussion of the results found in this study. Possible implications of these results for inservice programs are discussed in the next section.

### **Levels of Computer Use**

In general, levels of computer use were moderate. Yet, inservice teachers appear to have used computers more often for "own use" and "teaching use" than for "student learning". One possible reason for this may be that inservice teachers

feel more comfortable using computers for their own use and teaching compared to using them with their students. Similar results were found in other research studies (Larner & Timberlake, 1995; Marcinkiewicz, 1993/1994, 1994/1995). Larner and Timberlake (1995) stated that there was a wide variation in computer usage among teachers. The researchers noted that the most often cited examples of uses of computers were for: (1) writing letters to parents, (2) creating schedules, (3) creating and writing report cards, and (4) creating tests. Furthermore, Marcinkiewicz (1993/1994, 1994/1995) found that teachers' levels of computer use were determined by how important computers were to their teaching. In other words, levels of use were based on a teacher's level of involvement with computers. This suggests that when teachers view computers as quite indispensable for their "own use" and "teaching use" would they then perhaps use computers for "student learning". Thus, levels of computer use may be determined by how critical computers were to teachers in general.

For "own use", teachers appear to have used computers most often for "personal needs" and less often for "hobbies/interests" and "leisure". Since none of the items in the levels of computer use section of the questionnaire asked subjects to specify their "personal needs" in detail, further insight into this finding is limited.

With respect to "teaching use", inservice teachers appear to have used computers least often for "evaluation of software/hardware" and "communication

with other teachers". In the area of software evaluation, Zammit's (1992) research had similar findings. The researcher suggested that it was time consuming and perhaps even a little frustrating for teachers to find out what software was available and assess its quality and appropriateness for their curriculum. In addition to educational software varying significantly in quality and applicability, the pedagogical assistance provided to teachers to integrate computer software into their teaching varied as well. Furthermore, teachers in this study appear not to have used computers often to communicate with other teachers. This may be due to a lack of adequate equipment in the schools to allow teachers to perform this task. Moreover, inservice teachers may feel less comfortable using a computer to communicate with other teachers or may not see much of a need for such use.

No significant univariate results at the 1% level were found for "evaluation of software/hardware" as well. Before students begin working on computers, teachers likely first evaluate the computer and its software to determine whether they are worthwhile before using them in their classroom. Perhaps many of the teachers in this study evaluate software/hardware to some limited degree regardless of their self-confidence, self-competence, perceived value of computers, and computer experience. Yet, this evaluation may largely focus on software only.

For "student learning", teachers appear to have used computers most often for "educational games". There are several possible reasons for this finding. One, educational games are helpful in addressing easily met lower-level objectives such

as those involving knowledge, comprehension, or reinforcement of learned skills.

Two, the objectives in educational games are quite apparent unlike many computer applications/resources such as spreadsheets and the World Wide Web (WWW).

Three, educational games usually require less direction from the teacher in that the teacher usually plays a less significant role when students use computers for games.

Four, many educational games are readily accessible in the schools and thus available to teachers. Results from this study suggest that for "student learning", "educational games" are an important part of a teaching methodology to address instructional objectives.

Overall, very few significant relationships were found between the independent variables and levels of computer use for "student learning". Self-confidence, self-competence, and computer experience were not significantly related to computer use for "student learning". Thus, the often made assumption that when teachers feel comfortable or have a lot of experience with computers they will use them for student learning is not supported by the findings of this study.

### **Self-Confidence**

In general, self-confidence was somewhat high. Inservice teachers appear to be most confident in using a computer for "personal needs" compared to other related items such as self-confidence "in general" or for "work". This suggests that teachers may first gain computer confidence personally then later become confident

using a computer overall or for their career.

Confidence in using a computer "in general", for "personal needs", and "work" were found to be significantly related to the levels of computer use for "own use" and "teaching" but not for "student learning". This is quite surprising. Although self-confidence has been widely used as a general concept related to how "comfortable" individuals are using a computer (see, e.g., Woodrow, 1987; Stevens, 1982), results from this study suggest that this general concept is not significantly related to "student learning" in particular but is related to "own use" and "teaching".

Furthermore, confidence in "gaining new computer knowledge and skills" was not significantly related to any level of computer use. One group of inservice teachers excluded from this study were those enrolled in the computer inservice course. Assuming that most teachers taking such courses are interested and self-confident in "gaining new computer knowledge and skills", results from this study suggest that these teachers may not use computers more often than other teachers when they begin the course.

### Self-Competence

Overall, self-competence was moderate. Yet, inservice teachers appear to be most competent in using a computer for "own teaching needs" versus those self-competence items related more to student instruction. This suggests that perhaps many of the teachers in this study feel more capable of using a computer for their

career compared to using them with their students.

Surprisingly, self-competence, the concept of "feeling capable", was not significantly related to levels of computer use for "teaching" or "student learning" at the 1% level. Thus, the assumption that teachers who feel capable will use computers to greater extent than those who lack this feeling is not supported by the findings of this study.

#### Perceived Value of Computers

In general, perceived values of computers were somewhat high. Yet, inservice teachers appear to have valued computers more for "personal needs", "creating instructional support materials", and simple student uses such as "improving students' knowledge", and "improving students' motivation". Thus, teachers may consider computers to be quite valuable for their own use, career, and lower-level student learning. Kellenberger's (1994, 1996) and Reed's (1986) studies corroborated these findings. These researchers found that successful computer use was very much dependent upon how valuable teachers perceive computers to be to education. However, results from this study suggest that this perception may largely focus on lower levels of pedagogy compared to those related to individualizing students' needs or skills development.

Significant relationships were found for both "personal" and "career" related value and associated levels of computer use. Thus, when teachers placed little value on computers as personal or career tools, associated computer use was



limited. Yet, when teachers valued computers for personal or career needs, associated computer use was higher.

Of most importance was the finding that the perceived value of computers for "classroom instruction in general" was the only significant relationship found with the level of use for "student learning" at the 1% level. Thus, the role of value in possibly influencing computer use related to student learning appears to be much larger than that of self-confidence, self-competence, or computer experience. This corroborates Kellenberger's (1994, 1996) research which reached somewhat similar conclusions.

### Computer Experience

In general, computer experience was moderate. Yet, most inservice teachers not only had completed some computer-related university courses and taken some workshops related to computers, but most owned a computer and indicated that their computer use had increased over the past 2 years. This is encouraging and suggests that teachers do focus on professional development.

Surprisingly, none of the computer experience items were significantly related to any level of computer use at the 1% level. Thus, the assumption that when teachers have some experience with computers they will use them either for their own use, teaching, or student learning is not supported by the findings of this study. Again, this finding corroborates Kellenberger's (1994, 1996) research studies with preservice teachers.

### **Perceived Likelihood of Using Computers under Differential Access to Resources**

Results from this study showed that when computer hardware is limited within a school, schools may realize a greater likelihood of inservice teachers using computers when the computers are grouped together in a computer lab rather than having computers in each classroom. This appears to have been true whether a reservation for the computer lab was required or not.

This study also found that inservice teachers appear to have been more likely to use computers when there are many programs available in their classroom or at their school, compared to when only a few programs are available in their classroom. As such, schools may wish to purchase a single-user copy of a program for the entire school rather than purchasing multiple copies of computer software for use in classrooms in the hopes of increasing the likelihood of teachers using computers. In addition, there appears to have been a noticeable decrease in the perceived likelihood of inservice teachers using computers when the programs had to be booked through the board office in comparison to when the programs were available at the school. Thus, schools may realize a higher likelihood of teachers using computers when the computer programs do not need to be reserved for use.

Results further suggested that inservice teachers appear to have been more likely to use computers when a computer-knowledgeable individual was either in their classroom or in the next room, compared to when the computer-knowledgeable person was either elsewhere in the school or at the board office.

As such, schools may realize a higher likelihood of teachers using computers when a computer-knowledgeable individual is readily available and accessible to all. This may be accomplished through strategically assigning classroom teachers in the schools.

Overall, inservice teachers' perceived likelihood of using computers for "teaching" was significantly related at the 1% level to only two resources: computers and programs. Although research conducted by Reed (1986) and Zammit (1992) found that access to computer hardware, software, and support were important factors affecting teachers' computer use, results from this study suggest that access to computer hardware and software play a larger role in affecting use than access to computer support staff.

#### Implications for Inservice Programs

Implications related to the allocation of computer resources within schools and boards were discussed in the previous section. This section will focus entirely on the implications for inservice programs. From the results, four suggestions for inservice programs are provided below.

One, self-confidence was found to be significantly related to personal and teaching uses only. As a result, inservice instructors may wish to focus some attention on making inservice teachers feel more comfortable around computers. Yet, they must realize that improving self-confidence may have little or no impact on inservice teachers' use of computers for "student learning". As such, perhaps

inservice courses may need to focus on improving inservice teachers' self-confidence in using a computer for course-related purposes at the very beginning only.

Two, surprisingly, self-competence was not found to be significantly related to levels of computer use for "teaching" or "student learning" at the 1% level. Thus, inservice courses that focus largely on making inservice teachers feel more capable using computers may have limited results. As such, inservice instructors may need to realize that teachers who feel competent using computers will not necessarily use them more often than those who do not.

Three, similarly, computer experience was not found to be significantly related to any level of computer use at the 1% level. As a result, inservice courses that focus primarily on providing teachers with computer experience may have little or no influence on inservice teachers' overall computer use. Yet, inservice instructors need to understand that computer experience may play an important role in influencing other aspects such as providing inservice teachers with the necessary skills and knowledge to perform specific tasks, or to usefully integrate computers into their own classroom programs.

Four, the perceived value of computers for "classroom instruction in general" was the only significant relationship found with the level of computer use for "student learning" at the 1% level. Moreover, perceived value of computers was also significantly related to "own use" and "teaching use" as well. Thus,

inservice courses may need to focus on the value that inservice teachers place on computers for personal and teaching needs, and most importantly, for classroom instruction in general. With a large emphasis on the value of computers rather than inservice teachers' self-competence in using computers or their computer experience, this may indeed represent a distinct shift in the pedagogy of many current inservice courses.

### Limitations of the Study

This study was not without limitations. One, all of the limitations inherent in empirical research of this type apply for this study as well. In other words, the possibility that a significant result occurred by chance cannot be excluded.

Two, the survey was confined to inservice teachers at one university located in Southwestern Ontario. Thus, some caution should be taken in generalizing the results to inservice teachers from other areas.

Three, the research design only afforded the researcher with information about whether or not relationships existed between the selected variables. As such, conclusions related to cause and effect can only be suggested using these results.

### Suggestions for Further Studies

In general, this study explored the relationships between inservice teachers' beliefs about computers and their levels of computer use. Yet, temporal studies in the area of teachers' computer use may be necessary as it was beyond the scope of this study to generalize these findings over time. Clearly, follow-up studies about

whether inservice teachers' perceived computer use remains somewhat consistent over time would be useful.

Since none of the items in the questionnaire asked subjects to specify their "personal needs" in detail, future research in this area is needed. By examining specific aspects of "personal needs", further insight into teachers' computer use may result.

In addition, future researchers may want to compare levels of computer use among teachers enrolled in computer inservice courses and those enrolled in other inservice classes. The purpose of this research would be to determine whether the teachers who have completed computer inservice courses report using computers more often for personal, teaching, and student uses than their counterparts.

Finally, studies are needed to determine whether there is a relationship between self-reported use of computers and actual use. Although conceptual frameworks linking these two aspects have been established for students, nonetheless the confirmation of this relationship for inservice teachers is important. Yet, this study did establish a relatively simple framework for explaining inservice teachers' perceived computer use.

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## **APPENDIX**

## **Appendix A**

### **Questionnaire with Cover Letter**

**Dear Colleague,**

**As a candidate for the degree of Master of Education, I am interested in exploring inservice teachers' perceived computer use.**

**I would greatly appreciate it if you could take some time to complete a self-report inventory. The questionnaire will assess your beliefs and use of computers. The collection of data will take approximately 15 minutes of your time. The return of the completed survey will serve to indicate that you have given your consent to be a participant.**

**Please be assured that your responses will be treated confidentially. A copy of the results of this study can be obtained upon availability. You are under no obligation to participate in this research and at any time, if you wish to withdraw, you may do so. No remuneration will be provided.**

**If you have any questions, please feel free to contact me at XXX-XXXX or my advisor, Dr. David Kellenberger, who can be reached at 253-4232, ext. XXX. Furthermore, any specific concerns of an ethical nature can be addressed to Dr. Larry Morton, Chair of the Research Ethics Committee of the Faculty of Education at the University of Windsor.**

**Thank you in advance for your time and your co-operation.**

**Sincerely,**

**Samantha Hendricks**

**Encl.**

## COMPUTER USE QUESTIONNAIRE

### PART I

Please check (✓) the appropriate box.

1. Gender:      ☐ Female      ☐ Male

Please respond to the following statements.

2. Age: \_\_\_\_\_

3. Years of Teaching Experience: \_\_\_\_\_

Please check (✓) the appropriate box.

4. Status:      ☐ Teacher      ☐ Administrator  
                 ☐ Other. please specify \_\_\_\_\_

### PART II

Please carefully read the following statements and respond by circling 1, 2, 3, 4, or 5 to rate your beliefs.

NOT \_\_\_\_\_ SOMEWHAT \_\_\_\_\_ VERY  
CONFIDENT                      CONFIDENT                      CONFIDENT  
1                      2                      3                      4                      5

---

How confident are you:

- |  |   |   |   |   |   |
|--|---|---|---|---|---|
| 1. using a computer in general?              | 1 | 2 | 3 | 4 | 5 |
| 2. using a computer for your personal needs? | 1 | 2 | 3 | 4 | 5 |
| 3. using a computer for your work?           | 1 | 2 | 3 | 4 | 5 |
| 4. gaining new computer knowledge?           | 1 | 2 | 3 | 4 | 5 |
| 5. gaining new computer skills?              | 1 | 2 | 3 | 4 | 5 |

**PART III**

Please carefully read the following statements and respond by circling 1, 2, 3, 4, or 5 to rate your beliefs.

NOT \_\_\_\_\_ SOMEWHAT \_\_\_\_\_ VERY  
 COMPETENT 1 2 3 4 5  
 COMPETENT

---

How competent are you:

- |    |   |   |   |   |   |   |
|----|---|---|---|---|---|---|
| 1. | using a computer to assist you with your own teaching needs that are not directly related to student use? | 1 | 2 | 3 | 4 | 5 |
| 2. | using a computer to individualize students' needs?  | 1 | 2 | 3 | 4 | 5 |
| 3. | integrating computers into instruction?   | 1 | 2 | 3 | 4 | 5 |

**PART IV**

Please carefully read the following statements and respond by circling 1, 2, 3, 4, or 5 to rate your beliefs.

NOT \_\_\_\_\_ SOMEWHAT \_\_\_\_\_ VERY  
 VALUABLE 1 2 3 4 5  
 VALUABLE

---

How valuable are computers for:

- |    |  |   |   |   |   |   |
|----|--|---|---|---|---|---|
| 1. | your personal needs?                               | 1 | 2 | 3 | 4 | 5 |
| 2. | creating instructional support materials?          | 1 | 2 | 3 | 4 | 5 |
| 3. | classroom instruction in general?                  | 1 | 2 | 3 | 4 | 5 |
| 4. | individualizing students' needs?                   | 1 | 2 | 3 | 4 | 5 |
| 5. | improving students' knowledge?                     | 1 | 2 | 3 | 4 | 5 |
| 6. | improving students' development of various skills? | 1 | 2 | 3 | 4 | 5 |
| 7. | improving students' motivation to learn?           | 1 | 2 | 3 | 4 | 5 |

**PART V**

Please carefully read the following statement and respond by circling 1, 2, 3, 4, or 5 to rate your computer experience.

NO EXPERIENCE                      SOME EXPERIENCE                      A LOT OF EXPERIENCE  
 1    2    3    4    5

---

1. How much experience do you have using a computer?                      1   2   3   4   5

Please check (✓) the appropriate boxes.

2. Over the past 2 years, my computer use can be categorized as:

☐ Decreasing                      ☐ Remaining the same                      ☐ Increasing

3. Do you own a home computer?                      ☐ Yes                      ☐ No

Please respond to the following questions.

4. In the past 2 years, how many computer-related university credit hours have you taken (1 credit hour is equivalent to meeting 1 hour/week for one semester)?

\_\_\_\_\_

5. In the past 2 years, how many hours have you spent taking workshops related to computers?

\_\_\_\_\_

**PART VI**

Please carefully read the following statements and respond by circling 1, 2, 3, 4, or 5 to indicate the likelihood of you using computers.

NOT \_\_\_\_\_ SOMEWHAT \_\_\_\_\_ VERY  
LIKELY 1 2 3 4 5  
LIKELY

**A) Computers**

How likely would you use computers with your class on a regular basis if:

- |    |  |   |   |   |   |   |
|----|--|---|---|---|---|---|
| 1. | you had only one computer in your classroom?                                       | 1 | 2 | 3 | 4 | 5 |
| 2. | you had a few computers in your classroom?   | 1 | 2 | 3 | 4 | 5 |
| 3. | you had to reserve computer equipment for use in your classroom?                   | 1 | 2 | 3 | 4 | 5 |
| 4. | you had a computer lab in your school?   | 1 | 2 | 3 | 4 | 5 |
| 5. | you had to book a time for your students to use the computers in the computer lab? | 1 | 2 | 3 | 4 | 5 |

**B) Programs**

How likely would you use computers with your class on a regular basis if:

- |    |   |   |   |   |   |   |
|----|---|---|---|---|---|---|
| 1. | you had only a few computer programs in your classroom?   | 1 | 2 | 3 | 4 | 5 |
| 2. | you had many programs in your classroom?                  | 1 | 2 | 3 | 4 | 5 |
| 3. | you had many computer programs available at your school?  | 1 | 2 | 3 | 4 | 5 |
| 4. | you had to reserve computer programs through your school? | 1 | 2 | 3 | 4 | 5 |
| 5. | you had to book programs through the board office?        | 1 | 2 | 3 | 4 | 5 |

**C) Computer-Knowledgeable Individual**

How likely would you use computers with your class on a regular basis if:

- |    |   |   |   |   |   |   |
|----|---|---|---|---|---|---|
| 1. | you had a computer-knowledgeable individual in your classroom?                            | 1 | 2 | 3 | 4 | 5 |
| 2. | the nearest computer-knowledgeable teacher was in the room right next door to your class? | 1 | 2 | 3 | 4 | 5 |
| 3. | the nearest computer-knowledgeable assistant was elsewhere in your school?                | 1 | 2 | 3 | 4 | 5 |
| 4. | the nearest computer-knowledgeable individual resided at the board office?                | 1 | 2 | 3 | 4 | 5 |

Please respond to the following question.

1. How many computers do you have in your classroom? \_\_\_\_\_

Please check (✓) the appropriate box.

2. Do you have a computer lab in your school? [ ] Yes [ ] No



**PART VII**

Please check (✓) the appropriate box. If "no", this completes the questionnaire. If "yes", please answer the questions in this last section.

1. Do you use a computer at all? ☐ Yes ☐ No

Please carefully read the following statements and respond by circling 1, 2, 3, 4, or 5 to indicate your level of computer use.

NOT OFTEN 1 2 3 4 5 VERY OFTEN

**A) Own Use**

How often do you:

- |  |   |   |   |   |   |
|--|---|---|---|---|---|
| 1. use a computer for leisure?           | 1 | 2 | 3 | 4 | 5 |
| 2. use a computer for hobbies/interests? | 1 | 2 | 3 | 4 | 5 |
| 3. use a computer for personal needs?    | 1 | 2 | 3 | 4 | 5 |

**B) Teaching**

How often do you:

- |  |   |   |   |   |   |
|--|---|---|---|---|---|
| 1. use a computer to prepare instructional materials?          | 1 | 2 | 3 | 4 | 5 |
| 2. use a computer for preparation of newsletters to parents?   | 1 | 2 | 3 | 4 | 5 |
| 3. use a computer to prepare school-related reports/schedules? | 1 | 2 | 3 | 4 | 5 |
| 4. use a computer for evaluation of software/hardware?         | 1 | 2 | 3 | 4 | 5 |
| 5. use a computer to communicate with other teachers?          | 1 | 2 | 3 | 4 | 5 |

**C) Student Learning**

How often do you:

- |  |   |   |   |   |   |
|--|---|---|---|---|---|
| 1. use a computer for class demonstrations?          | 1 | 2 | 3 | 4 | 5 |
| 2. use a computer for educational games?             | 1 | 2 | 3 | 4 | 5 |
| 3. use a computer to individualize students' needs?  | 1 | 2 | 3 | 4 | 5 |
| 4. use a computer for integrated student activities? | 1 | 2 | 3 | 4 | 5 |

**THANK YOU FOR YOUR TIME AND ASSISTANCE**

### **Vita Auctoris**

**Samantha Hendricks was born in Cape Town, South Africa in 1971. She graduated from Mary Ward Catholic Secondary School, located in Toronto, in 1990 with an Ontario Secondary School Diploma (OSSD). From there she went on to the University of Windsor where she obtained a B. A. (Honours) in French Language and Literature in 1995, and a B. Ed. in 1996. She is currently a candidate for the degree of Master of Education at the University of Windsor and anticipates graduating in the 1998 Fall Term.**